



Reference Mission Description Document Status

- **Reference Mission Description Document completed on January 13**
 - Included comments from SAO/GSFC team
 - Updated sections for consistency and added figures in Appendix
- **The document was distributed to baseline it on January 13**
 - Review comments are due by January 24 from C-X Management Team and Technology IPT Leads
 - The comments will be collected and disposition will be submitted to CCB on February 1
- **The present baseline documents the four satellite configuration used for cost estimate of FY1999 budget exercise**
 - Old Top Level Requirements

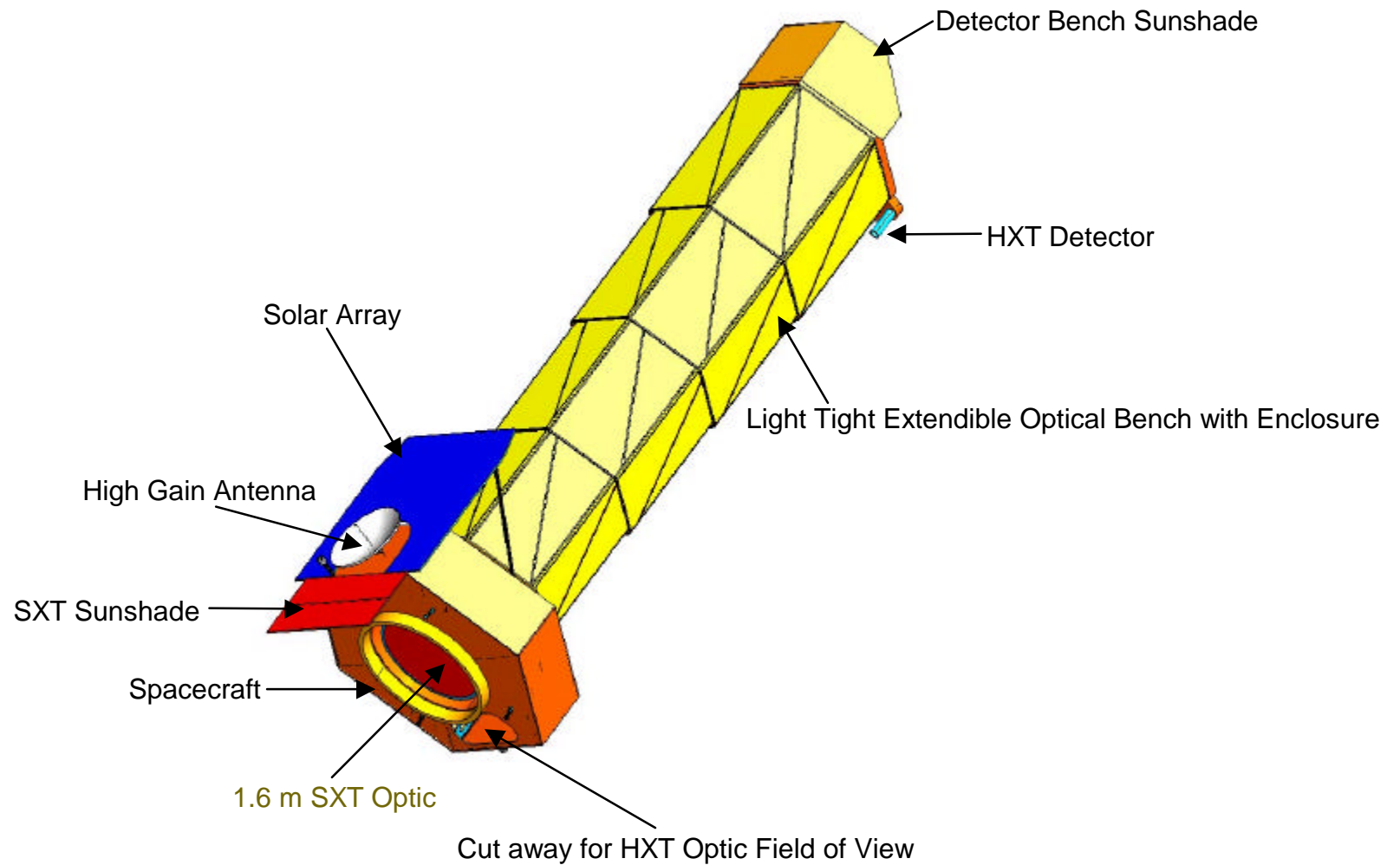


Reference Mission Configuration

- **Reference configuration developed for demonstration of feasibility, establishment of technology requirements and development of cost estimates**
- **Four satellites in mission; launched two at a time on an Atlas V or Delta IV**
- **Each satellite has:**
 - One Spectroscopy X-ray Telescope (SXT) with a 1.6 meter optic
 - Three Hard X-ray Telescopes (HXT) with 0.4 meter optics
 - One Extendible Optical Bench provides 10.0 meter focal length for SXT and HXT and retracts to accommodate dual launch
 - One Calorimeter Detector Assembly at SXT focus cooled by Turbo-Brayton Cryo Cooler with ADR to 50 mK
 - One Gratings Assembly, aft of SXT Optic, disperses x-rays onto an array of eight CCD's located on Rowland Circle
 - One CdZnTe Detector Assembly for each HXT
 - Separable spacecraft bus and instrument modules

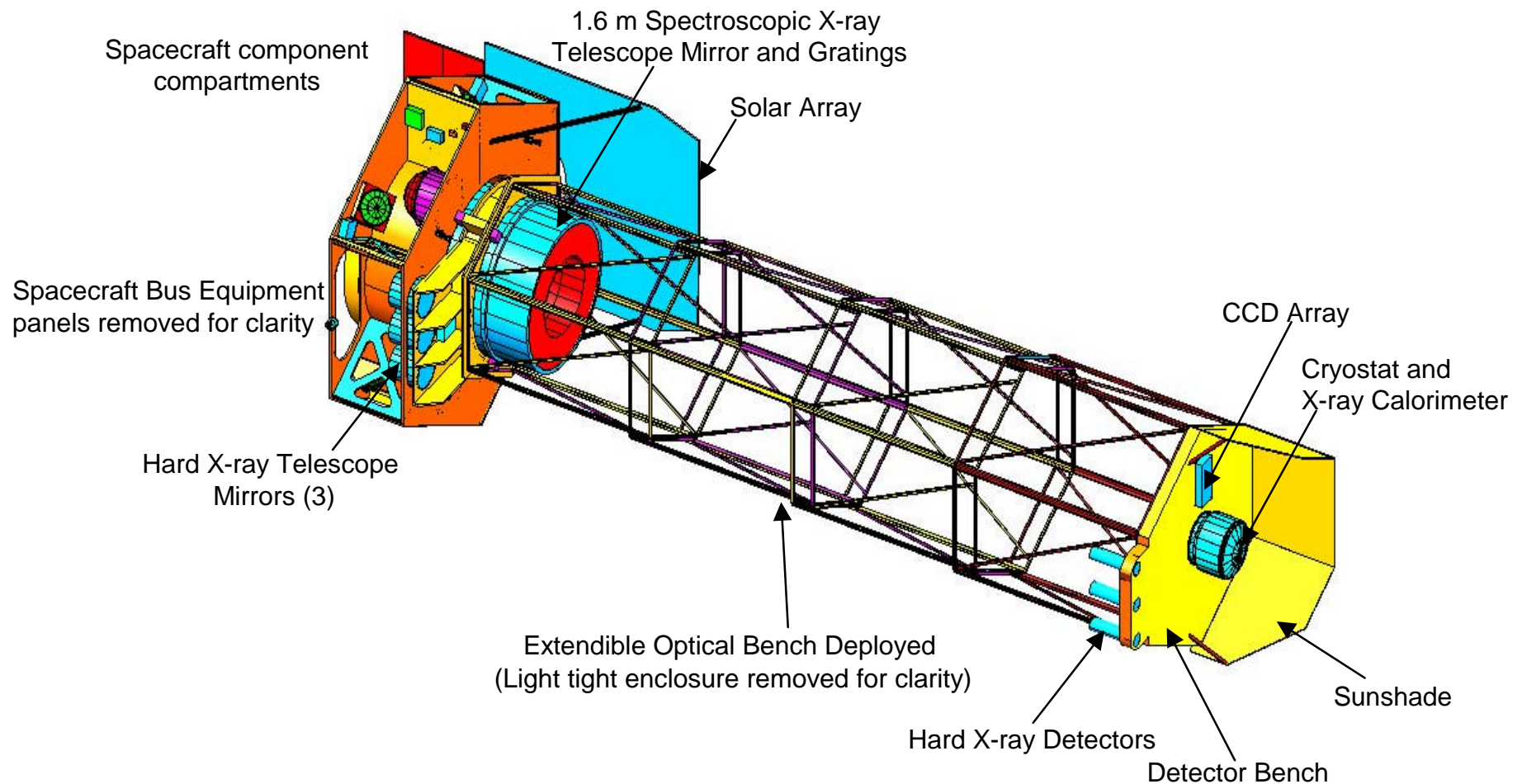


Reference Configuration



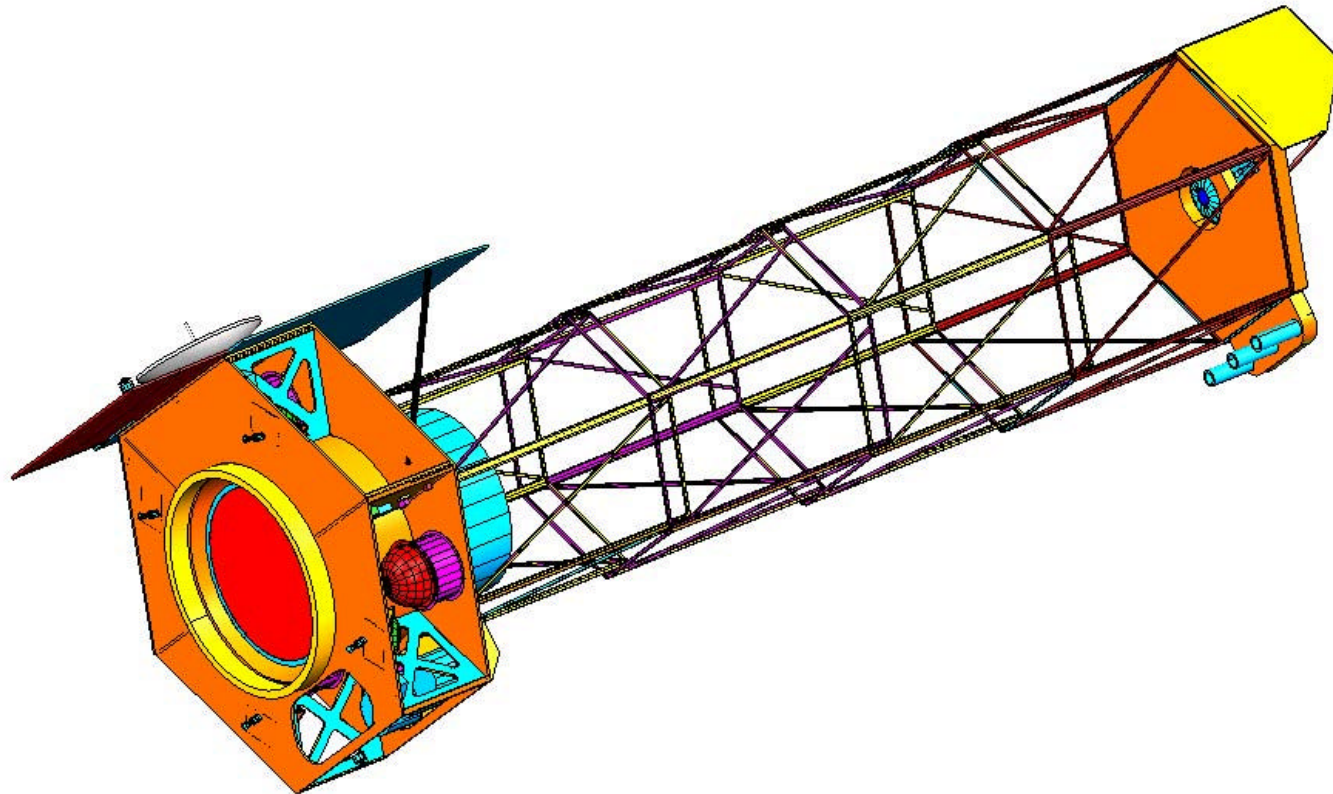


Reference Configuration View from Detector End





Reference Configuration View from Optics End



Constellation-X



Reference Mission Description Documents

Future Plans

- **The document will be baselined by early February**
- **The document will go through revision 1 by March 31**
 - The new Top Level Requirements will be developed by March 31
 - The configuration will be revised to reflect the new Top Level Requirements in parallel
- **The document will go through revision 2 by August 15**
 - The new Top Level Requirement's Flow Down and Error Budgets will be released on June 15
 - The configuration will be revised to reflect the Flow Down and Error Budget changes

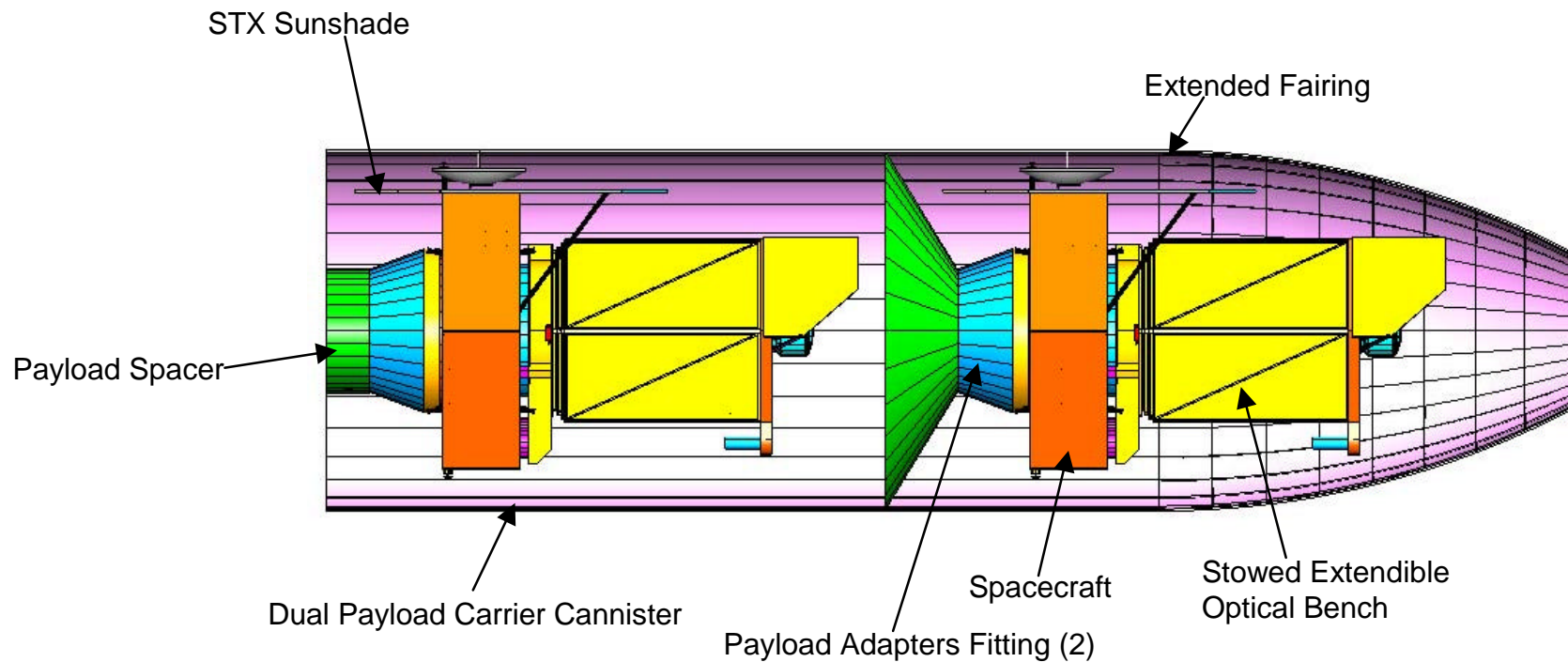


Launch Vehicle Status

- **Initial GSFC Access To Space Group** trades selected Atlas V-551 to insert two Constellation-X satellites into the lunar swingby orbit
 - 5 meter diameter, 87 feet long extended payload fairing
 - 5 solid strap on Booster Rockets
 - 1 heavy common core booster rocket and RD-180 engine
 - Estimated insertion capability of 6650 Kgs. at C3=-2.6
 - Available in December 2002
- **KSC Expendable Launch Vehicle Group** is performing internal feasibility study for Constellation-X
 - Study will be completed by mid February
 - Study covers the performance and cost using Long Fairing and Dual Payload Attach Fitting



Launch Configuration



Atlas V Dual Manifest Launch Configuration - Side View



Resource Summaries

- **Mass Estimate**

Item	Satellite Mass (Kg)	Launch Mass (Kg)
Instrument Module	1407	2814
Wet Spacecraft Bus	774	1548
Margin		<u>788</u>
Total Launch Mass		5150
Estimated Atlas V-551 Net Launch Capability C3=-2.6		
		5150 Kgs

- **Power Estimate Per Satellite**

Average Satellite Power Requirement	814 Watts
End of Life Power Capability	1100 Watts

- **Telemetry Estimate per Satellite**

S-Band Telemetry (Housekeeping Data)	2 Kbps
X-Band Telemetry (Science Data)	1.7 Mbps
Telemetry Down Link Time Approximately	1 hour/day



Mass Estimate of Instrument Module

Item	Mass (Kg)
Mirror 1.6 m with Grating	750
CCD	20
HXT Optics 0.4 m	189*
HXT Detectors	33*
Calorimeter	33
Cryo System	90
EOB	292
TOTAL	1407

*This exceeds NRA allowable mass of 195 Kgs for HXT Detectors and Optics(Adjusted for 4 satellites



Mass Estimate of Spacecraft Bus

Item	Mass (Kg)
Structure	175
Mechanisms	7
Power	122
Thermal	17
Propulsion Hrdwr	35
Attitude Cntr Hrdwr	73
C&DH	7
Communications	38
Integration Mtrls	120
Propellent, etc	180
TOTAL	774

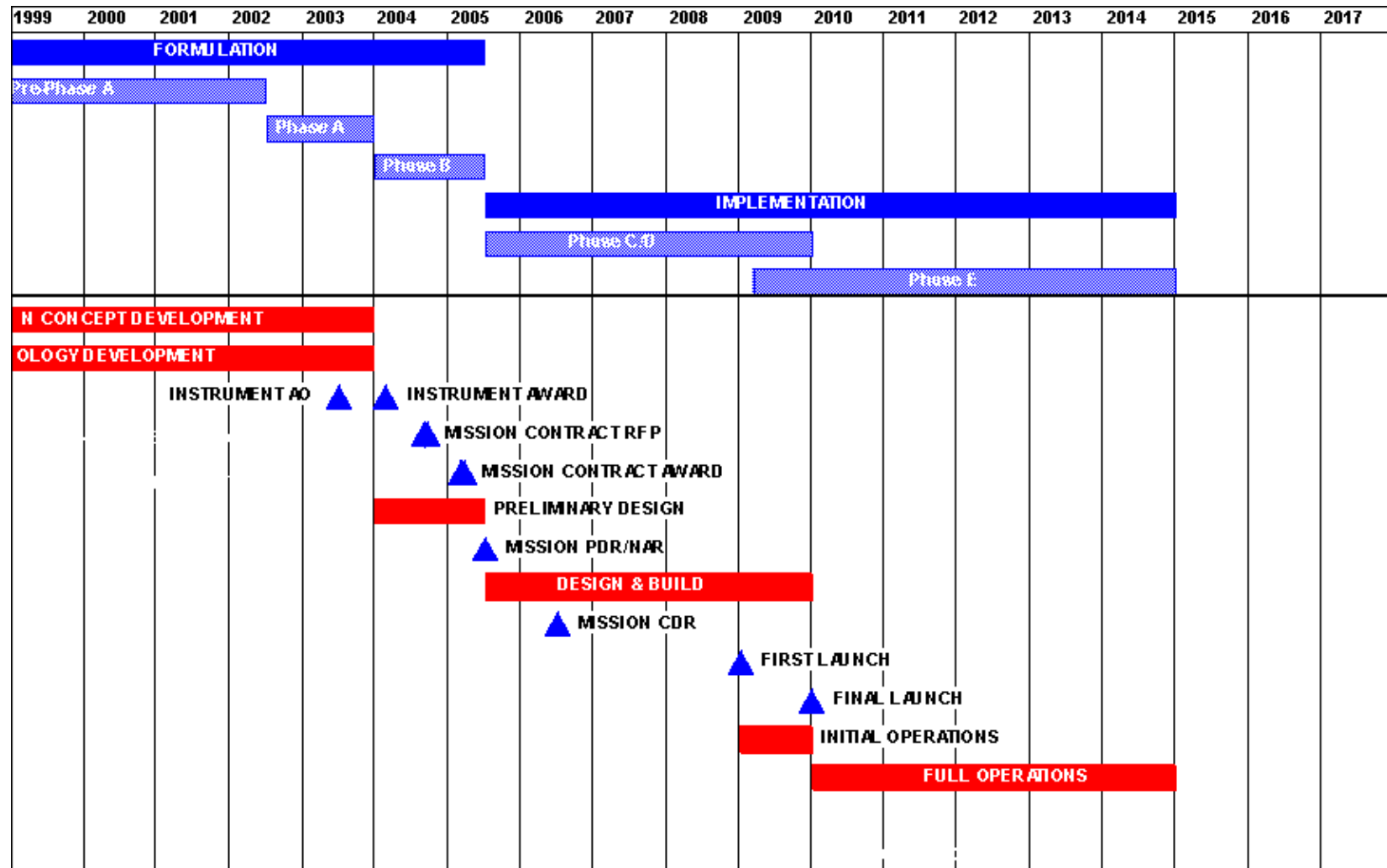


Orbital Insertion and Operation Study

- **L2 Lissajous Orbit for Constellation-X is based on Microwave Anisotropy Probe(MAP) orbit**
- **The Constellation-X has unique requirements**
 - The insertion (without collision) of two satellites simultaneously
 - Orbital Maneuvers to phase two of them simultaneously for Lunar Swingby
 - Constellation Management for efficient operations and high viewing efficiency
- **The study will start in February and the report will be available by August 15**

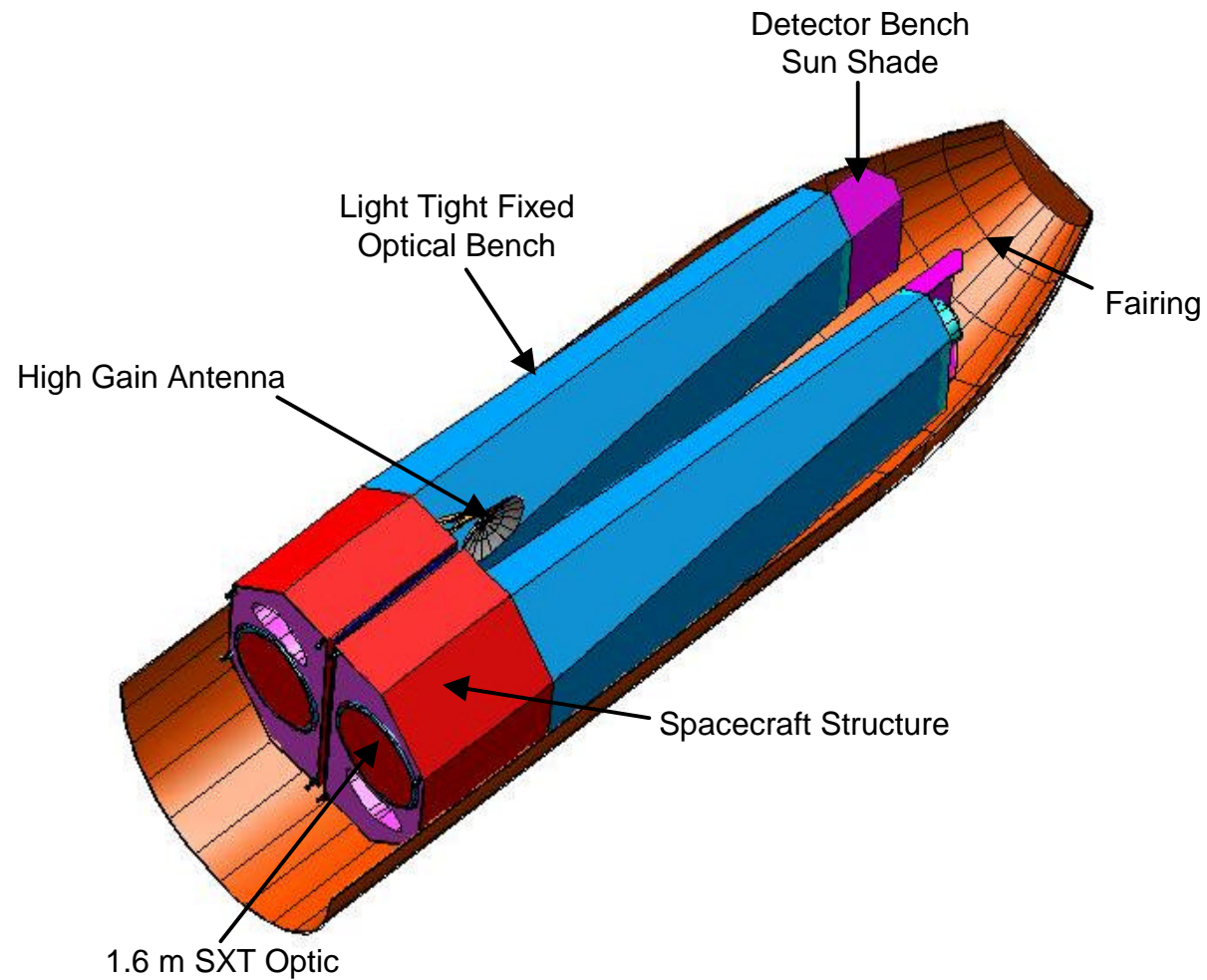


Mission Schedule for 2005 New Start





Fixed Optical Bench Configuration





Fixed Optical Bench Configuration

- **Two fixed optical bench satellites in Atlas Extended Fairing**
 - Components similar to Reference Configuration
 - Reduced mass due to elimination of Dual Payload Adopter and optical bench deployment mechanism
 - Solves insulation issues and meets light tight requirements
 - Facilitates alignment and test
- **The configuration so far addresses packaging concept only**
 - GSFC mechanical subsystems is verifying the concept
 - Spacecraft Component layout will be modified due to various requirements
 - Launch vehicle interface will be defined for the configuration